

A Revision of the *Nomada* Subgenus *Nomadita* of North America (Hymenoptera: Anthophoridae)

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Abstract.—The North American portion of the *Nomada* subgenus *Nomadita* is revised. Six species, including one new species (*Nomada timberlakei*), are recognized. *Nomada antonita* Cockerell is placed in synonymy with *Nomada snowii* Cresson. *Nomada rodecki* Mitchell is removed from the subgenus *Nomadita* and placed in the subgenus *Nomada*. The Eurasian species of *Nomadita* are discussed. A new subgenus, *Asteronomada* is described based upon *Nomada adducta* Cresson and three new species (*N. brewsterae*, *N. durangoae*, and *N. portalensis*) are described.

INTRODUCTION

Bees of the genus *Nomada* Scopoli (1770) are brightly colored (combinations of red, black, and yellow or white) and sparsely pubescent, with a wasp-like appearance. Over 900 names have been proposed in the genus (pers. obs.). Representatives of this genus occur on nearly every continent (Hurd, in Krombein, et al., 1979). Most species are believed to be kleptoparasites of *Andrena*, but *Halictus*, *Agapostemon*, *Nomia*, and *Exomalopsis* are also known hosts of *Nomada* sensu lato. This study was undertaken because *Nomadita* has only recently been recognized as holarctic. There is one new species in North America, and two species have been incorrectly included in the subgenus.

HISTORICAL REVIEW

The genus *Nomadita* was described by Mocsary (1894) to accommodate a single new European species, *Nomadita montana* Mocsary. Dusmet (1913) synonymized *Nomadita* with *Nomada*. *Nomadita* is not mentioned in the literature again until Snelling (1986) revived it as a senior synonym of *Callinomada* Rodeck (1945). Present European workers do not use subgenera within the genus *Nomada*.

Rodeck (1945) described the subgenus *Callinomada* based upon several species that had previously been included in the subgenus *Holonomada* Robertson. He designated *N. antonita* Cockerell as the type of *Callinomada* and included *N. aquilarum* Cockerell, *N. mutans* Cockerell, *N. placida* Cresson, *N. snowii* Cresson and *N. verecunda* Cresson. The subgenus *Callinomada* was revised by Rodeck (1949). No new species were described, but *N. omahaensis* Swenk was synonymized with *N. snowii*,

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and *N. dacotensis* Swenk and *N. cockerelli* Graenicher were synonymized with *N. aquilarum*. Mitchell (1962) described *Nomada* (*Callinomada*) *rodecki* for an eastern species.

Snelling (1986) revised the new world *Nomadini*. He revived *Nomadita* as a subgenus of *Nomada* with *Callinomada* as a junior synonym. Three European species were included in the subgenus, *N. montana*, *N. roberjeotiana* Panzer, and *N. rufipes* Fabricius. Tentatively assigned to the subgenus was *N. adducta* Cresson. Schwarz (1986) synonymized *N. montana* with *N. roberjeotiana* Panzer. *Nomada obtusifrons* Nylander, *N. errans* Lepeletier and *N. palmeni* Morawitz were included in the subgenus *Nomadita*. A number of names belonging in *Nomadita* have been overlooked by these authors.

Callinomada was characterized (Rodeck, 1945) as having the pronotum sharp-carinate, the antennal scape obconic in males, the hind tibiae with 3–5 short stout spines and the apex of metasomal sternum seven broad. Rodeck (1949) differentiated *Callinomada* from *Holonomada* by size, season of flight, sparse pubescence, and shape of the male genitalia. Moalif (1979) clarified the distinguishing characteristics of *Callinomada*, which included the penis valve without apical ventral hooks, the gonostylus clothed with long dense hair, and the gonocoxites separated from each other by a distance greater than the width of the gonostylus. Snelling (1986) characterized *Nomadita* by “minimum length of 1st flagellar segment equal to, or exceeding, maximum length of second, propodeum not swollen mesad of spiracle; genal margin subcarinate; male sternum 8 rather broad, margins tapering distally; female metabasitarsis broadest near base; propodeum bare or nearly so, with little or no erect hair.”

The subgenus *Nomadita* is Holarctic and the type species is European. A number of names have been proposed and the correct synonymy is unclear. The old world species should be revised, but that is beyond the scope of this study. The following is a list of names known or believed to belong to the subgenus *Nomadita*.

roberjeotiana Panzer, 1799

panzeriana de Walckenaer, 1802

neglecta Herrich-Schaeffer, 1839

roberjeotiana var. *alpina* Morawitz, 1867

dybovskii Radoszkovsky, 1876

montana Mocsary, 1894

tormentillae Alfken, 1901

aino Tsuneki, 1973

errans Lepeletier, 1841

errans var. *korleviciana* Friese, 1921

errans var. *sibirica* Friese, 1921

momoglonis Tsuneki nom. nov. for *melanura* Tsuneki 1973 nec Mocsary 1883

momoglonis hakusana Tsuneki nom. nov. for *melanura hakusana* Tsuneki 1973 nec Mocsary 1883

obtusifrons Nylander, 1848

okamotonis Matsumura, 1912

okamotonis var. *kaiensis* Tsuneki, 1976

palmeni Morawitz, 1888

rufipes Fabricius, 1793

- vaga* Panzer, 1798
solidaginis Panzer, 1799
solidaginis var. *picta* Kirby, 1802
solidaginis var. *rufopicta* Kirby, 1802
solidaginis var. *punctulifera* Friese, 1921
solidaginis var. *minutula* Friese, 1921
sempiterna Morawitz, 1894

Cockerell (1928) described four *Nomada* species from Siberia, and stated that they were closely related to *N. roberjeotiana*. His descriptions indicate that *N. olhae* and *N. jasnitskii* probably belong in the subgenus *Nomadita*. *Nomada scheviakovi* might also be included. *Nomada belikovi* is probably not a species of *Nomadita* because Cockerell said the first antennal flagellar segment was shorter than the second, which is not true of *Nomadita*.

Both the Eurasian and the North American species of *Nomadita* are midsummer to fall flying bees, and are found mainly on small-flowered composites. The first flagellar antennal segment is longer than the second and the occipital margin is sharply angulate (almost carinate in some species). The shape of the male genital capsule and eighth gastric sternum provide strong evidence for the synonymy of *Nomadita* and *Callinomada*. The differences between the Eurasian species (Figs. 7–9, 17–19) and the American species (Figs. 1–6, 10–16) are minor. The shape of the eighth sternum is unusual within the genus *Nomada* in that the apex is broadly rounded (as in Figures 1–9). Eurasian species usually have a pro-coxal spine, which is rudimentary or absent in North American species. *Nomada obtusifrons*, *N. rufipes*, *N. errans* and *N. okamotonis* have pro-coxal spines. *Nomada okamotonis* and *N. obtusifrons* have a very prominent supraclypeal area, which is flattened dorsally and bordered by a thickened carina (scrobe). The supraclypeal area of *N. roberjeotiana* is quite prominent and forms a sharp angle with the frons above the antennal insertions, but it is not flattened or bordered by a carina. These differences are small compared with the overall similarity between the North America and Eurasian species of *Nomadita* and are not sufficient to warrant the maintenance of the subgenus *Callinomada*.

The first antennal flagellar segment of *Nomada rodecki* Mitchell, unlike *Nomadita*, is shorter than the second. The eighth sternum is elongated apically and not rounded, and the gonostyli of the genital capsule bear dense, long, curled hairs. This species is active in May, which is almost two months earlier than any species of *Nomadita*. *Nomada rodecki* belongs in the subgenus *Nomada* as defined by Snelling (1986), and is closely related to *N. beulahensis* Cockerell and *N. banksi* Cockerell.

Nomada adducta Cresson was removed from the subgenus *Pachynomada* by Snelling (1986) and tentatively placed in *Nomadita*. The swollen antennal scape of the male, the general body shape, and the form of the eighth sternum are similar to *Pachynomada*. The genital capsule (especially the lack of a ventral subapical projection on the penis valves) and the form of the hind basitarsus of *N. adducta* are similar to those of *Nomadita*. *Nomada adducta* differs from *Nomadita* by the following: the shape of the eighth sternum; the lack of a sharply carinate occipital margin; the dense, appressed plumose hairs on the hind coxa and propodeum; and the globose antennal scape. Because *N. adducta* does not fit with either *Pachynomada* or *Nomadita*, I removed it from *Nomadita* and designated it as the type species of a new subge-

nus, *Asteronomada*. The subgenus *Asteronomada* contains three new species in addition to the type species.

BIOLOGY

Little is known about the biology of *Nomadita*. It is found only from late summer to fall, and usually visits small-flowered composites for nectar, especially *Solidago* and *Chrysothamnus*. It has been suggested (Snelling, 1986) that the host of *Nomadita* is the *Andrena* subgenus *Cnemidandrena*. Attempts to determine the host of this subgenus have been unproductive due to the scarcity of the bee. Perkins (1919) reported the hosts of all the British *Nomadita*. *Andrena fuscipes* is the host of *N. flavipes* Illiger (*solidaginis* Panzer), *A. tarsata* for *N. tormentillae*, *A. coitana* for *N. obtusifrons*, and *A. denticulata* and *A. fuscipes* for *N. rufipes*.

TERMINOLOGY

The morphological terminology used in this paper generally follows that of Michener (1944) or Stephen, et al. (1969). The following section explains some terms and abbreviations that may be unfamiliar.

Acetabular carina: Distinct lamella at the dorsal base of the mandible, especially prominent in male *Nomada*.

Flagellar: Referring to the antennal flagellum.

Hypospiracular band: Area along the ventral margin of the propodeum, extending upwards to the propodeal spiracle.

IOD: Interocellar distance (distance between lateral ocelli).

IPS: Interpunctural surface (areas of integument between punctures).

MLOD: Mid to lateral ocellar distance.

MOD: Middle ocellar diameter.

MOOM: Distance between mid-ocellus and occipital margin.

OOD: Ocellocular distance (distance between lateral ocellus and apex of compound eye).

Pre-lobar carina: Ridgelike continuation of the posterior margin of the pronotum, which tapers down to the anterior of the pronotal lobe.

Pre-occipital ridge: Posterior margin of the head is sharply angulate, in some cases sub-carinate.

Sternum: See tergum.

Supraspiracular ridge: Propodeal spiracle sunken, with ridge-like thickening dorsal to it. In some species it may protrude noticeably, being flat and shelf-like dorsally.

Tergum or sternum as used here refers to metasomal sclerites only.

SUBGENUS *NOMADITA*

Nomada Subgenus *Nomadita* Mocsary

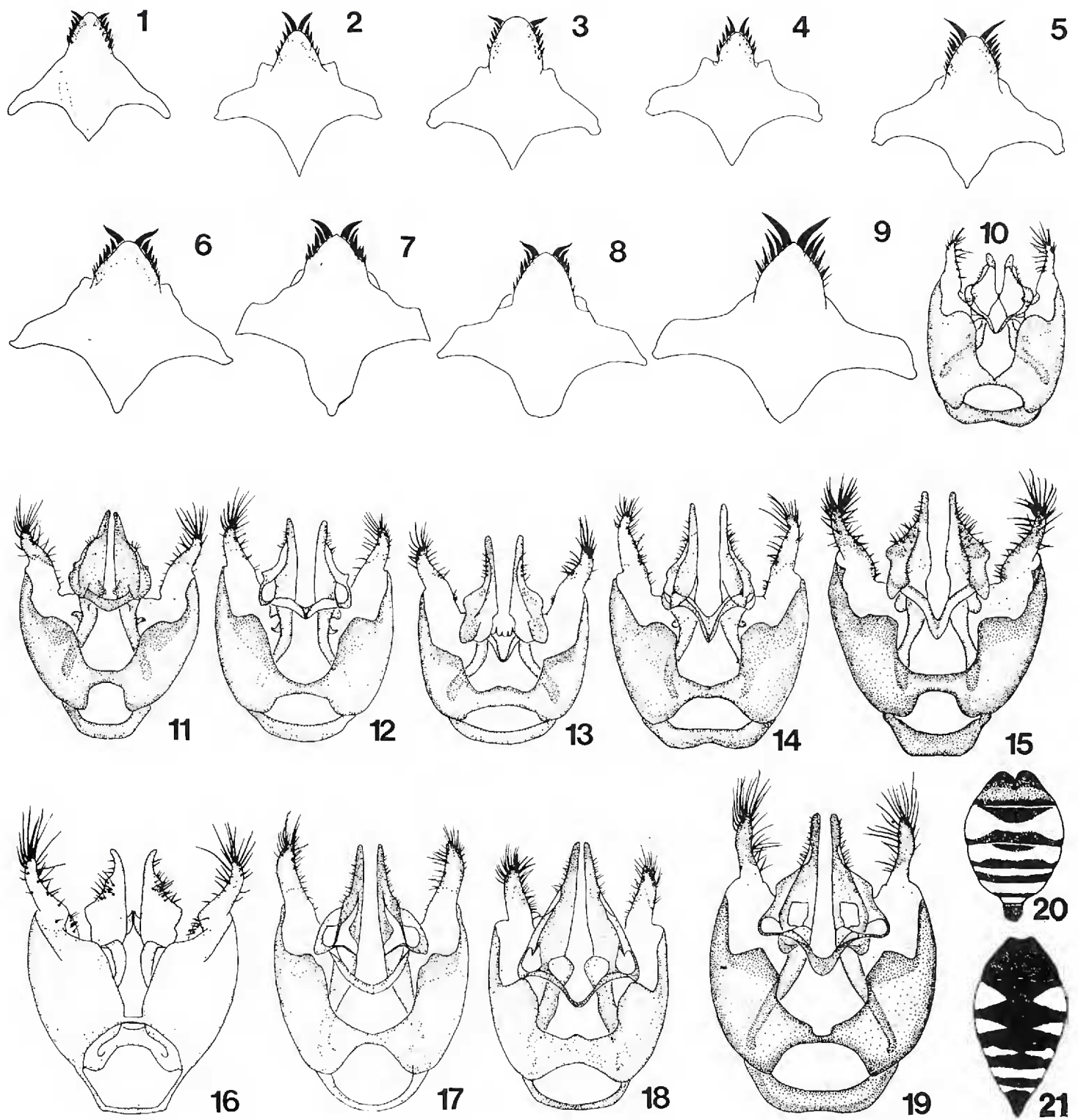
Nomadita Mocsary, 1894, Termes. Fuzetek 17:37.

Type species: *Nomadita montana* Mocsary, 1894.

Nomada (*Callinomada*) Rodeck, 1945, Entomol. News LVI:181.

Type species: *Nomada antonita* Cockerell, 1909.

Diagnosis: The short, broadly rounded apex of the male eighth sternum immediately separates *Nomadita* from all related subgenera. *Nomadita*, *Pachynomada*, and *Asteronomada* all differ from *Nomada* s.l. by having sparse, straight, relatively short pubescence on the gonostyli of the male genital capsule, and by having the apex of



Figs. 1–21, subgenus *Nomadita*

Figs. 1–9, male sternum 8; 1) *mutans*, 2) *placida*, 3) *timberlakei*, 4) *verecunda*, 5) *aquilarum*, 6) *snowii*, 7) *roberjeotiana*, 8) *rufipes*, 9) *okamotois*; Figs. 10–15, genital capsule of North American species (dorsal); 10) *mutans*, 11) *placida*, 12) *timberlakei*, 13) *verecunda*, 14) *aquilarum*, 15) *snowii*; Fig. 16) *snowii* (ventral); Figs. 17–19, genital capsule of Eurasian species (dorsal); 17) *roberjeotiana*, 18) *rufipes*, 19) *okamotois*; Fig. 20) abdomen of *snowii*, Fig. 21) abdomen of *aquilarum*

the eighth sternum **not** being narrow, elongated and parallel-sided. *Nomadita* differs from *Nomada* s.s. by having the first flagellar segment longer than the second, the apex of the mandibles simple, or lacking long, thin hind tibial apical bristles. The hind tibial apex lacks the dense cluster of fine setae present in *Holonomada* and *Laminomada*. The sharply angulate to subcarinate occipital margin and the short, broad apex of the eighth sternum which bears heavy lateral setae separates *Nomadita* from *Pachynomada*, *Asteronomada*, and *Phelonomada*. *Nomadita* also differs from

Asteronomada by the lack of dense appressed pubescence on the sides of the propodeum and dorsum of the hind coxae which obscures the integument in *Asteronomada*.

Description: Length 5.9–11.1 mm, forewing length 4.0–8.4 mm; minimum length of first flagellar segment greater than or equal to maximum length of second, antennal scape never globose, flagellum lacking prominent ridges or teeth; occipital margin sharply angulate, subcarinate in some species; supra-clypeal area distinctly prominent between antennal insertions, with prominent frontal carina; labrum with transverse subapical row of uneven denticles; mandibles simple; head densely punctate with smooth, shiny interpunctural surfaces; pronotal ridge apex sharply angulate anteriorly, abruptly depressed medially; pre-lobar carina prominent, sloping gradually to pronotal lobe; scutum contiguously punctured, not reticulate, interpunctural surface glassy, puncture rims rounded; tegulae glassy, sparsely punctate; propodeal sides densely punctate, apilose, swollen posterior to spiracle but not angulate; mesopleuron densely punctate, with rounded punctural rims, IPS smooth and shiny; procoxal spine rudiment ranging from sharp angulation to prominent spine; hind tibial apex with 4 to 10 distinct bristles arranged in one to three uneven rows; forewing with three submarginal cells; abdominal terga densely punctate, apical impunctate band width approximately two puncture diameters; male sternum 8 with short broad apex bordered by stout bristles; genital capsule (dorsally) with gonocoxites apically separated by broad emargination; gonostylus with long apical hairs (twice width of gonostylus); penis valve without ventral subapical projection.

KEY TO THE NORTH AMERICAN SPECIES OF *NOMADITA*

- 1) Integumental maculations lemon-yellow to orange yellow 2
- Integumental maculations white or ivory 5
- 2) First tergum without a complete transverse median yellow band, usually having no light maculations at all, terga 2 & 3 with bands strongly narrowed medially, usually interrupted (as in fig. 21) *placida* Cresson
- First tergum with a complete yellow transverse median band and/or bands on remaining terga are thick, not strongly narrowed medially (never interrupted). 3
- 3) Legs and entire mesopleuron with bright rufo-ferruginous markings, contrasting strongly with dark areas of thorax (southern Colorado) *snowii* Cresson
- Legs and mesopleuron brown to black, not contrasting strongly with dark areas of thorax, never more than small ferruginous mark on mesopleuron (California, Oregon, western Nevada) 4
- 4) Scutellum protruberant, interpunctural surface dull, apex of pronotal ridge rounded; males with entire anterior surface of antennal scape yellow, and mesopleural maculation always with a process reaching at least to pronotal lobe, usually extending to dorsal margin of pleuron; females with axillae and/or scutum always with at least a small yellow maculation *timberlakei* n.sp.
- Scutellum flattened, sparsely punctate, interpunctural surface shiny, apex of pronotal ridge sharp, knifelike; males with anterior surface of scape with at least a basal brown patch, mesopleural maculation only rarely extending upwards behind pronotal lobe (usually only a small anterior triangle present); females with axillae and/or scutum usually without any yellow maculations *verecunda* Cresson
- 5) Legs with bright rufo-ferruginous markings, contrasting sharply with dark portions of thorax; all of the following areas with at least some white marking (prono-

- tal ridge and lobes, tegulae, scutellum and metanotum) *snowii* Cresson
 — Legs black to dark brown (sometimes light brown, but if so, then thorax also light brown); any or all of the following areas may have white marking (pronotal ridge and lobes, tegula, scutellum and metanotum) 6
 6) Scutellum prominent, tergum 1 without a complete white band (usually completely black), at least one tergal band interrupted medially, supraspiracular ridge strong, shelf-like dorsally, mesopleuron black *aquilarum* Cockerell
 — Scutellum flattened, shiny, tergum 1 usually with a complete transverse median band, other tergal bands usually entire, supraspiracular ridge weak, mesopleuron usually with white maculations *mutans* Cresson

THE NORTH AMERICAN SPECIES OF *NOMADITA*

Nomada (Nomadita) aquilarum Cockerell

Nomada aquilarum Cockerell, 1903. Ann. Mag. Nat. Hist. 12:208–209. Holotype, male: “No. 13183, 8 . 18, NM, S Fk Eagle Cr, Abt 8000 ft., Coll. Townsend, on fls *Erigeron macranthus*”. Type Depository, United States National Museum.

Nomada cockerelli Graenicher, 1911. Bull. Pub. Mus. Milwaukee 1:221–249. Holotype, male: “No. 37769, Hudson, St. Croix Co., between July 6 and 12, 1910”. Type Depository, Pub. Mus. Milwaukee.

Nomada dacotensis Swenk, 1913. Nebr. Univ. Studies 12:88. Holotype, female: “2803, Fargo, N. D. Aug. 17, 1911, O. A. Stevens, *Grindelia squarrosa*”. Type Depository, University of Nebraska, Lincoln.

Diagnosis: Differs from *placida*, *timberlakei*, and *verecunda* by the presence of white instead of yellow maculations. Differs from *snowii* by the lack of ferruginous markings on the legs or thorax and broken transverse median maculations on the abdominal terga. Differs from *mutans* by the presence of a strong denticle on the pro-coxae, a prominent scutellum which is not flattened or highly polished, and the shelf-like supra-spiracular ridge. It differs from most *mutans* by having the first tergum all black and several terga with medially interrupted transverse maculations.

Male: Length 6.3–9.4 mm, forewing length 4.7–6.2 mm, hindwing length 3.8–4.9 mm; scape densely, almost contiguously punctured, IPS shiny, somewhat shagreened; IOD 0.31 mm, OOD 0.38 mm, MLOD 0.09 mm, MOD 0.17 mm, MOOM 0.39 mm; IPS within ocellar triangle roughened; labrum with broken subapical transverse carina; acetabular carina distinctly lamellate; pre-lobar carina sharp, gently sloping; pronotal ridge with abruptly angulate, deeply punctate apex; tegulae very sparsely punctate, glassy; scutellum protruberant, bilobate, coarsely punctate, scuto-scutellar suture deeply depressed, posterior interpunctural surface coarsely, transversely micro-rugose; propodeal sides with very rough IPS, supraspiracular ridge strong, forming distinct flattened shelf above spiracular opening, distinct vertical groove posterior to spiracle; metapleuron with ventral half shallowly punctate; short but stout pro-coxal spine rudiment present; hind tibial apex with 5 bristles, posterior 2 clear and quite thin; forewing with 3 submarginal cells (left wing of type with incomplete 1st intercubitus), infuscated with clear subapical crescent: COLOR: lower half of clypeus, sides of face along compound eyes halfway to antennal insertion, malar space, basal half of mandibles, labrum (in part), pronotal lobes, lateral spots on tegulae, apex of scutellar lobes, apical and basal portions of tibiae, apex of hind-femora, lateral median triangular patches on terga 2–4, complete transverse median bands on terga 5–6, apical lateral crescents on sterna 3–5, creamy-white; antennae ferruginous; remainder of body dark brown to black.



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Figure 33. Distribution of the species of the subgenus *Nomadita*

Female: Length 6.2–8.1 mm, forewing length 5.1–5.6 mm, hindwing length 4.2–4.4 mm; very similar to male.

Discussion: This species is widely distributed along the Rocky Mountains. It has the most strongly developed pro-coxal spines of any of the North American species, but they are not as pronounced as those of the Eurasian species.

Material Examined: CANADA: Alberta: Aspen Beach, 1 ♀ 24–VIII–1944 (O. Peck) CNC; Beaverlodge, 1 ♂ 9–VII–1931 (O. Peck) UCM; Jasper, 1 ♂ 21–VII–1938 (E. H. Strickland) UCM; Manitoba: Pilot Mound, 1 ♂ 31–VII–1958 (A. & J. Brooks) CNC; Northwest Terr.: Fort Smith, 1 ♂ 31–VII–1950 (J. B. Wallis) CNC; Saskatchewan: Elbow, 1 ♂ 18–VII–1960 (A. R. Brooks) CNC; Prince Albert, 1 ♂ 23–VII–1959 (A. & J. Brooks) CNC; Rutland, 1 ♂ 26–VII–1940 (A. R. Brooks) CNC, 1 ♂ 26–VIII–1940 (A. R. Brooks) BBSL; Yukon Terr.: Whitehorse, 1 ♀ 20–VIII–1959 (R. Madge) CNC; U.S.A.: Minnesota: Polk Co., Maple Lake, 1 ♂ 18–VII–1968 *Cirsium* sp. (W. E. LaBerge) BBSL; New Mexico: Otero Co., 4.0 km (2.5 mi) E. of Cloudcroft, 2770 m (9100'), 2 ♂ ♂, 1 ♀ 9–VIII–1947 (B. Valentine) AMNH; Silver Spr. Cyn. Mesc. Apa. I. Res., 3 ♂ ♂, 4 ♀ ♀ 26–VII–1970 BBSL; North Dakota: Fargo, (O. A. Stevens), 1 ♂ 13–VIII–1910 *Solidago serotina* UNEB, 1 ♀ 17–VIII–1911 *Grindelia squarrosa* 1 ♀ 19–VIII–1923 *Solidago canadensis* UCM, 1 ♀ 20–VIII–1917 *Solidago canadensis* UCM, 1 ♀ 25–VIII–1917 *Solidago canadensis* UCM, 1 ♂ 26–VIII–1917 *Solidago canadensis* UCM; Grand Forks, 2 ♂ ♂ 19–VIII–1917 (P. W. Fattig) UCM; Granville, 1 ♂ 7–VIII–1915 *Grindelia squarrosa* (O. A. Stevens) UCM; Stutsman Co., Jamestown, 1 ♂ 7–VIII–1962 (J. G. & B. L. Rozen) BBSL; Wisconsin: Milwaukee, 1 ♂ 5–VII–1908 (S. Graenicher) UCM; Clark Co., Worden Township, 1 ♂ UCM, 1 ♂ AMNH 27–VII–1919; Wyoming: Yellowstone N.P., 1 ♂ 23–VII–1930 UCM;

Nomada (Nomadita) mutans Cockerell

Nomada (Holonomada) mutans Cockerell, 1910. Psyche 17:91–92, 98. Holotype, female: “No. 13192: W. M. Mann, Pullman, Wash., VIII:9:08”. Type Depository, United States National Museum.

Diagnosis: Differs from *placida*, *timberlakei*, and *verecunda* by having white instead of yellow maculations. Differs from *aquilarum* by having the apex of the procoxae smoothly rounded, a flattened, sparsely punctate, shiny scutellum, and the absence of prominent supraspiracular ridges. Differs from *snowii* by the lack of rufo-ferruginous markings on the legs which contrast strongly with the thorax. If the legs of *mutans* are light brown to ferruginous, the propodeum and thorax are usually the same color.

Male: Length 6.3–7.7 mm, forewing length 4.5–5.9 mm, hindwing length 3.5–4.0 mm; very similar to female.

Female: Length 5.9–8.9 mm, forewing length 4.0–5.9 mm, hindwing length 3.0–4.7 mm; scape with dense shallow punctures, sparse posteriorly, IPS smooth, shiny; IOD 0.35 mm, OOD 0.34 mm, MLOD 0.16 mm, MOD 0.17 mm, MOOM 0.39 mm; pre-occipital ridge acutely angulate; subapical transverse ridge of labrum broken, with distinct median nipple; acetabular carina reduced to small basal; lamella; pre-lobar carina distinct, gradually sloping; pronotal ridge strongly angulate, depressed medially; scutal punctures with rims rounded, not angulate; tegulae sparsely punctate with highly polished IPS; metanotum not flattened medially, not laterally expanded; supraspiracular ridges not prominent; metapleuron sparsely punctate; procoxal spine rudiments lacking; metasternum ridged medially; hind tibial apex with 5 heavy, dark bristles in an overlapped double row; forewing with 3 submarginal cells; COLOR: antero-apical patch on scape, clypeus (except basal margin), labrum, basal half of mandibles, malar space, sides of face to apex of scape, ring behind compound eye to same height, pronotal ridge and lobes, tegulae in part, scutellum, metanotum, crescent behind pronotal lobe, anterior and posterior mesopleural triangles, apical

patches on meso- and meta-sternum, spot on pro-coxae, larger on mid- and hind-coxae, ventral apical stripe on pro-femora, basal and apical bands on tibiae, apical band on mid-femora, spot on hind-femora, incomplete apical and basal bands on mid- and hind-tibiae, complete transverse bands on tergum 1–5, transverse bands on sterna 2–4, white; remainder of body piceo-fuscous.

Discussion: *Nomada mutans* contains the smallest North American *Nomadita*. This species ranges from the northern coastal areas inland to Montana and Utah. The black integument is brownish in some specimens. Specimens from Utah show a reduction in the amount and extent of white maculations, including an interruption of the abdominal bands, which makes them strongly resemble *N. aquilarum*.

Material Examined: CANADA: British Columbia: H.-Steele, 1 ♀ 15–VIII–1921 (W. B. Anderson) CNC; Oliver, 2 ♂ ♂ 15–IX–1923 (C. B. Garrett) CNC; Nicola, 1 ♂ 3–VIII–1923 (E. R. Buckell) CNC; U.S.A.: Arizona: Kaibab Forest, 1 ♀ 9–VIII–1936 (R. H. Beamer) SMEK; California: Siskiyou Co., Gazelle, 4 ♂ ♂ 11–IX–1950 (M. F. McClay) UCD; Klamath Lake, 1 ♂ 21–VIII–1954 (G. Ferguson); Idaho: Moscow, 1 ♀ (J. M. Aldrich) BBSL; Bonneville Co., Selander Park 16.9 km (10.5 mi) SW Idaho Falls, 1 ♀ 17–21–VIII–1979 (J. E. Slansky) CSDA; Owyhee Co., Homedale, 3 ♂ ♂ 24–VIII–1953 (R. M. Bohart) UCD; Valley Co., Lunch Creek, 1 ♀ 3–VIII–1964 (R. L. Westcott) BBSL; Montana: Gallatin Co., Hebggen Lake, 1 ♀ 30–VII–1974 (T. Griswold); Nevada: Austin, 1 ♂ 12–VIII–1940 (E. E. Kenaga) SMEK; Clark Co., Kyle Canyon 2130 m (7000'), 1 ♂ (F. D. Parker), 1 ♂ (R. C. Bechtel), 11–VIII–1959 *Solidago* NDAg; Elko Co., Wild Horse 1830 m (6000'), 2 ♀ ♀ 25–VII–1962 (R & K Dreisbach); Oregon: North Powder, 6 ♂ ♂ , 4 ♀ ♀ 24–VII–1938 *Solidago* (H. A. Scullen) ORSU; Powder River, 41.9 km (26 mi) E. Baker, 910 m (3000'), 1 ♂ 9–VIII–1937 (Bolinger-Jewett) ORSU; Queen Mine above Cornucopia, 1520 m (5000'), 1 ♂ 2–VIII–1937 (Bolinger-Jewett) ORSU; Baker Co., Baker, 1 ♀ 6–IX–1963 (J. S. Puckett) BBSL; Harney Co., Antelope Mt., 1980 m (6500'), 1 ♀ 14–VIII–1931 (D. K. Frewing) ORSU; Utah: Box Elder Co., Snowville, 1 ♂ 26–VIII–1969 *Chrysothamnus viscidiflorus* (G. F. Knowlton); Willard Basin, 1 ♂ 1–VIII–1961 (G. E. Bohart); Willard Pk., 1 ♂ 24–VIII–1964 (P. F. Torchio); Emery Co., 6.4 km (4 air mi) N. Gilson Butte 1550 m (5100'), 1 ♂, 1 ♀ 26–VIII–1985 (D. K. Broemeling), 1 ♂ 16/17–IX–1980 (T. Griswold); Goblin Vly. trn.off in sand dunes, 1 ♀ 16–IX–1979 (F. D. Parker D. Veirs); Huntington Cr. 2680 m (8800'), 1 ♂ 11–VIII–1973 (T. Griswold); Rich Co., Limber Pine, 2 ♂ ♂ , 2 ♀ ♀ 12–VIII–1984 (D. K. Broemeling); Utah Co., Mt. Nebo Loop, 1 ♀ 4–VIII–1977 (G. F. Knowlton); Washington: Bay Center, 1 ♀ 27–VII–1937 ORSU; Pullman, (W. M. Mann), 1 ♀ 30–VIII–08 USNM, 2 ♀ ♀ 9–VIII–08 UCM, 1 ♀ 9–VIII–08 USNM; Wyoming: Jackson, 1 ♀ 17–VIII–1961 (J. E. R. Stainer) CNC;

Nomada (Nomadita) placida Cresson

Nomada placida Cresson, 1863. Proc. Ent. Soc. Phil. 2:291–292. Lectotype, female: “Penn., 2600”. Allotype, male, “Penn., 2600”. Type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis: Differs from *aquilarum*, *mutans* and *snowii* by having yellow maculations instead of white. Differs from *snowii* by the lack of extensive ferruginous markings on the mesopleuron and legs and by having medially interrupted transverse maculations on at least one abdominal tergum. Differs from *timberlakei* and *verecunda* by the presence of one or more medially interrupted maculations on the abdominal terga and by the absence of maculations on the first tergum.

Male: Length 7.4–7.7 mm, forewing length 5.2–5.5 mm, hindwing length 4.0–4.3 mm; does not differ significantly from female.

Female: Length 5.9–7.9 mm, forewing length 4.7–5.4 mm, hindwing length 3.7–4.1 mm; scape moderately punctate; IOD 0.33 mm, OOD 0.35 mm, MLOD 0.13 mm, MOD 0.17 mm, MOOM 0.48 mm; occipital margin sharply angulate; labrum with 5 distinct teeth in transverse subapical row; acetabular carina nearly absent; pre-lobar carina strong; pronotal ridge with sharply angulate anterior margin, depressed medially, deep, large punctures; scutal punctures often reticulate; tegulae punctate anteriorly, nearly impunctate posteriorly, IPS glassy; scutellum faintly bilobate; suprascapular ridge angulate; hypoepimeral area not strongly protruberant; metapleuron with dense, even punctation; pro-coxae with weak spine rudiment; hind tibial apex with 5 heavy, dark bristles in a staggered row; forewing with 3 submarginal cells: COLOR: clypeus (except basally), sides of face extending upwards along compound eye to vertex, pronotal ridge and lobes, traces on tegulae, scutellum, metanotum, small anterior mesopleural triangle, tibiae dorsally, apex of hind coxa, abdomen as in illustration, yellow; supraclypeal area, antennae, base of clypeus, tegulae, legs, light brown; remainder of body black.

Discussion: This species appears to be restricted to the eastern half of the country. Its range does not overlap with any other yellow maculated species. Its closest relative would seem to be *N. verecunda*, but in structure and patterning it bears a strong resemblance to *N. aquilarum*.

Material Examined: CANADA: Ontario: Marmora, 1♂ 19–VIII–1952 (E. H. N. Smith) CNC, 1♂ 3–VIII–1952 (C. Boyle) CNC; U.S.A.: Illinois: Carlinville, (Robertson), 1♂, 1♀ AMNH; Lincoln, 2♂♂, 1♀ –IX– UNEB; Piatt Co., 3.2 km (2 mi) W White Heath Pres., 1♀ 22–IX–1982 (E. R. Miliczky) INHS; Vermilion Co., 8.1 km (5 mi) SE Westville Forest Glen Pres., 1♀ 30–IX–1980 (E. Miliczky) INHS; Indiana: Lafayette, 1♀ 4–IX–1930 (Geo. G. Ainslie) UCM; Kansas, Topeka: 1♂ –IX– J. (E. Taylor) ANSP; Yates Center, 1♀ 7–IX–1949 *Amphiachyris dracunculoides* (Michener-Beamer); Maryland: Glen Echo, 1♂ 21–IX–'30 *Aster ericoides* (J. C. Bridwell) USNM; Prince Geo. Co., Beltsville, 1♀ 24–IX–1964 (P. H. Arnaud, Jr.) CAS; Missouri: Ashland, 1♂ 30–VII–1966 (Poe) CORN; Nebraska: Lincoln, 2♂♂, 1♀ –IX– UNEB; New Jersey: Montclair, 1♀ 4–IX–1931 (M. A. Cazier) UCM; Trenton, 1♂ 2–IX–1906 (Harbeck) USNM; Union Co., Watchung Res., 2♀♀ 4–IX–1954 (G. Ferguson) BBSL; New York: Ft. Montgomery, 1♂ 9–IX–1917 (F. M. Schott) AMNH; Oswego Co., Granby Center, 1♀ 25–VIII–1950 CORN; Tompkins Co., (R. A. Morse) CORN, 1♂ 12–VIII–1960 *Solidago* sp., 1♂, 1♀ 17–VIII–1960 *Solidago* sp., 1♀ 12–VIII–1962 *Solidago* sp., 1♂ 22–VII–1962 *Daucus carota*, 1♂ 22–VIII–1958 *Solidago* sp.; Ohio: Hocking Co., 1♂ –VIII–192? (C. H. Kennedy) LACM; Pennsylvania: 1♀ ANSP paratype 2600.4; 1♂ ANSP paratype 2600.3; Carlisle Jc., 1♂ 28–VIII–1909, (W. S. Fisher) USNM; Virginia: E. Falls Ch., 1♂ 19–IX–1920 (S. A. Rohwer) USNM; Glen Carlyn, 1♀ 20–IX–1930 (Timberlake) LACM; Minors Hill Falls Ch., 1♂ 13–IX–1912 (C. T. Greene) UCM; Fairfax Co., Scott Run, 1♀ 6–IX–1969 (A. S. Menke, D. R. Miller) LACM.

Nomada (Nomadita) snowii Cresson

Nomada snowii Cresson, 1878. American Hymenoptera 75. Lectotype, female: "Col. Snow, 2597". Type Depository, Academy of Natural Sciences of Philadelphia.

Nomada antonita Cockerell, 1909. Canadian Entomologist 41:35–36. Holotype,

male: "No. 29473, Antonito, Col., 8-5-00". Type Depository, United States National Museum. NEW SYNONYMY

Nomada (Holonomada) omahaensis Swenk, 1915. University Studies XV:17. Holotype, male: "Omaha, Nebraska, August 29, 1914, on *Solidago canadensis* L. T. Williams". Type Depository, University of Nebraska, Lincoln.

Diagnosis: Differs from the other species by the rufo-ferruginous coloring on the legs strongly contrasting with the black propodeum. Differs from *aquilarum* and *placida* by having uninterrupted medial transverse maculations on the abdominal terga (except tergum 1 which often lacks any light maculation). Differs from *placida*, *timberlakei* and *verecunda* by the presence of white rather than yellow maculations.

Male: Length 6.3–11.1 mm, forewing length 4.8–8.4 mm, hindwing length 3.6–6.7 mm; scape moderately punctate, interior and posterior punctation very sparse, interpunctural surface highly polished; IOD 0.48 mm, OOD 0.43 mm, MLOD 0.18 mm, MOD 0.19 mm, MOOM 0.56 mm; pre-occipital ridge thick, subcarinate; labrum with apical transverse carina, broken into distinct denticles; pre-lobar carina thickened, gently sloping to pronotal lobe; pronotal ridge apex sharply angulate; rims of scutal punctures angulate; tegulae sparsely, shallowly punctate, highly polished; scutellum slightly depressed medially, glossy; metanotum not flattened or laterally expanded medially; propodeum with thick, rounded supra-spiracular ridge, not prominent; hypo-spiracular area shiny, sparsely punctate; metapleuron with ventral half densely punctate; pro-coxal spine rudiment present, not prominent; hind tibial apex with single row of light ferruginous bristles; forewing with 3 sub-marginal cells, apex clear to somewhat clouded; pygidium entire with broadly rounded sides and flattened apex: COLOR: clypeus, sub-antennal area, ring around eye (broken dorsally), labrum, basal two-thirds of mandibles, pronotal ridge and lobes, tegulae, first axillary sclerite, scutellum, metanotum, anterior mesopleuron with posteriorly directed projection, coxal apices, ventral apical stripe on fore- and mid-femora, exterior of mid- and fore-tibiae, broad apical and basal patches on hind tibiae, transverse median band on tergum 2 broadly emarginate anteriorly, slightly narrowed transverse median bands on tergum 3–5, broad apical band on tergum 6, rectangle on sternum 1, broad transverse bands on remaining sterna, white; legs, ferruginous; remainder of body black.

Female: length 6.5–9.6 mm, forewing length 4.9–6.1 mm, hindwing length 3.7–4.6 mm; similar to males except: acetabular carina virtually absent, pro-coxal spine rudiments virtually absent, hind tibial apex with 4 heavy bristles and long thin posterior bristle, supra-clypeal area and basal half of clypeus ferruginous, posterior ventral mesopleuron ferruginous, tergum 1 ferruginous with white posterolateral patch, propodeum ferruginous.

Discussion: The type of *Nomada antonita* (except for sexual differences) is virtually indistinguishable from the female lectotype of *N. snowii*. The characters used by Rodeck to distinguish *N. antonita* in his revision (1949) are all variable in *Nomada*. I am therefore placing *N. antonita* Cockerell in synonymy with *N. snowii* Cresson. Northern specimens of *N. snowii* (= *omahaensis* Swenk) usually have a complete white band on tergum 1, stronger bands on the remaining terga, and a somewhat smaller pro-coxal spine rudiment than typical specimens. Both forms have been collected at the same time and place in both Colorado and South Dakota. I feel the two forms represent a clinal variation rather than distinct taxa. There is a specimen from Arriola in Montezuma Co., Colorado which differs from typical *N. snowii* in having

light lemon yellow maculations instead of white to cream-colored markings. There are no apparent structural differences between this specimen and typical *N. snowii*. In the absence of more specimens of this form it seems unadvisable to recognize it as a separate taxon.

Material Examined: CANADA: Alberta: 4.8 km (3 mi) SE Picture Butte, 1 ♂ 6–VIII–1978, 3 ♂♂, 2 ♀♀ 6–VIII–1978 *Solidago missouriensis* (C. D. Michener) SMEK; Lethbridge 2 ♂♂, 1 ♀ 28–VII–16, (Sladen) CNC; Manyberries, 1 ♂, 1 ♀ 11–VIII–1939, (E. H. Strickland), UCM; Medicine Hat, 1 ♀ 17–IX–1939 (J. L. Carr) UCM, 4 ♂♂, 2 ♀♀ 20–VIII–16, 1 ♀ 23–VIII–19 (Sladen) CNC; Saskatchewan: Eastend, 2 ♀♀ 10–IX–1939 (A. R. Brooks) CNC, BBSL; Swiftcurrent, 1 ♀ 23–VIII–16, (Sladen) CNC; MEXICO: Mexico: 39.5 km (24.5 mi) NW Toluca, 1 ♂ 30–VII–1962, (Naumann & Marston) BBSL; U.S.A.: Colorado: 1 ♂ 1930, (H. G. Rodeck) UCM; Boulder, 1 ♀ 18–VIII–1929, (W. W. Greulich) UCM; Fremont Co., Coaldale 1980 m (6500'), 1 ♂ 11–VIII–1964 *Helianthus annuus* BBSL, 2 ♂♂, 1 ♀ 11–VIII–1968 *Chrysopsis villosa* SMEK (C. D. Michener); Larimer Co., Chimney Rock 2440 m (8000'), 2 ♂♂ 30–VIII–1984 Ft.C, 1 ♀ 5–IX–1976 BBSL, 1 ♀ 23–VIII–1975, (H. E. Evans) Ft.C; Moffat Co., Mt. Hamilton, 16.1 km (10 mi S), 2 ♂♂ 11–VIII–1962, *Solidago*, (E. G. Linsley) CIS; Montezuma Co., ♀ 3 mi. W. Arriola 6000', IX–1975, Malaise Trap, (T. Marquardt) BBSL; Nebraska: Omaha, 1 ♂ 29–VIII–1914, *Solidago canadensis*, (L. T. Williams) UNEB, paratype; North Dakota: Bottineau, 1 ♂ 19–VIII–1923, 1 ♂ 23–VIII–1923 (C. N. Ainslie) AMNH; Valley City, 1 ♀ 15–VIII–1912, BBSL; Grand Forks Co., 17.7 km (11 mi) NW Inkster, 1 ♀ 17–VIII–1955, *Grindelia squarrosa*, (W. E. LaBerge) SMEK; New Mexico: Colfax Co., 8.1 km (5 mi) S Eagles Nest, 1 ♂ 14–VIII–1971, (J. G., B. L., & K. C. Rozen) AMNH; South Dakota: Custer, 1 ♂, 1 ♀ UNEB; Utah: Wayne Co., 27.4 km (17 mi) S. Bicknell, 1 ♀ 9–VIII–1950, (T. Cohn, P. Boone, M. Cazier) AMNH;

Nomada (Nomadita) timberlakei NEW SPECIES

Holotype, male: "Baldwin Lake, Cal., Sept. 1. 36, Timberlake Coll.,". Allotype, female: "Valley of the Falls, Cal., Sp.7.35 nr. *Eriogonum subscaposum*, Timberlake Coll." Type Depository, University of California, Riverside.

Diagnosis: Differs from *aquilarum*, *mutans* and *snowii* by having bright yellow instead of white maculations. Differs from *placida* by having complete transverse maculations on all abdominal terga. Differs from *verecunda* by having a prominent, dull scutellum (as opposed to flattened, sparsely punctate and highly polished), and the apex of the pronotal ridge is rounded. A difference in reflectivity of the abdominal terga is the best (but most difficult to describe) character for differentiating *tiberlakei* from *verecunda*. The abdominal terga of *tiberlakei* are closely punctate, shining a bright light upon the yellow portions of the abdomen will produce a diffuse reflection, giving the tergum a dull appearance. This same light will produce a sharp, circular reflection on *verecunda*. *Nomada tiberlakei* has much closer punctation on the terga, with a dull interpunctural surface. *Nomada verecunda* has more widely spaced punctation (1 to several puncture widths apart) and a polished interpunctural surface. The yellow abdominal maculations of *tiberlakei* are usually lighter colored than *verecunda*'s.

Males: Length 6.7–10.4 mm, forewing length 5.1–6.7 mm, hindwing length 3.7–5.2 mm; scape densely punctured with smooth shiny IPS; IOD 0.45 mm, OOD 0.38 mm, MLOD 0.17 mm, MOD 0.20 mm, MOOM 0.46 mm; pre-occipital ridge

present, not sharply angulate; sub-apical transverse ridge of labrum broken into 5 teeth; acetabular carina strong, lamellate; pre-lobar carina strong, sloping gently; pronotal ridge not angulate apically, depressed medially; scutal punctures with sharply angulate rims; tegulae sparsely punctate, glassy; scutellum bilobate; metanotum somewhat laterally inflated; supraspiracular ridge not prominent; metapleuron punctate; pro-coxal spine rudiment absent; hind tibial apex with 3 short anterior bristles, one long posterior bristle, fuscous, in strong contrast to yellow tibiae; yellow bands on abdomen not highly reflective: COLOR: anterior of scape, first flagellar segment, supraclypeal area (except subantennal sutures), clypeus, sides of face up to apex of compound eyes, malar space, labrum, basal two-thirds of mandibles, submandibular area and broad band extending halfway to vertex behind eyes, pronotal ridge and lobes, tegulae, axillary sclerites in part, mesopleuron except epimeral and posterior areas, posterior medial patch on meso- and metasternum, scutellum, metanotum, coxae (except bases), trochanters in part, femora (except basal areas), fore- and mid-tibiae, hind-femora (except medial annular ring), tarsi, extensive transverse medial bands on all terga, large patch on first sternum, almost all of remaining sterna, bright lemon yellow; remainder of body dark brown to black.

Females: Length 6.7–8.9 mm, forewing length 4.7–6.1 mm, hindwing length 3.7–4.7 mm; very similar to males, except with more extensive yellow markings.

Discussion: This species is difficult to separate from *verecunda*. It has frequently been misidentified as that species. *Nomada verecunda* is found in the mountains of northern California, Nevada, and southern Oregon. *Nomada timberlakei* has only been found in central and southern California.

Paratypes: U.S.A.: California: San Bern. Co., Barton Flat, So. Fork Camp, 4♂♂ 12-IX-1944, 1♂ 21-IX-1944, 1♂, 1♀ 24-IX-1944, 4♂♂ 3-IX-1944 (A. L. Melander) UCR; 1♂, 1♀ E. Fk. Santa Ana River, 19-IX-1945 (A. L. Melander) UCR; Riverside, 10♂♂, 1♀ 10-X-1931 *Baccharis emoryi*, 1♂ 10-X-1931 *Isocoma vernonioides*, 1♂ 16-X-1927 *Baccharis emoryi*, 1♂, 2++ 17-X-1931, *Baccharis emoryi* BBSL, 4♂♂ 18-IX-1927 *Isocoma vernonioides*, 1♀ 20-X-? *Isocoma vernonioides*, 1♂ 22-IX-1949 *Isocoma vernonioides*, 1♂ 23-X-1933 *Ericameria palmeri*, 2♂♂, 1♀ 8-X-1932 *Isocoma vernonioides*; So. Fork Camp, San Bernardino Mts., 1♂ 24-IX-1946 *Solidago californica*, 1♂ 2-IX-1946 *Solidago californica* BBSL (Timberlake); So. Fork Camp, San Bernardino Mts., 1890 m (6200'), (Timberlake) 1♂ 9-IX-1947 *Chrysothamnus*, 1♂ 2-IX-1946 *Solidago californica*, 1♂ 4-IX-1946 *Gutierrezia californica*; So. Fork Santa Ana R., S. Bern. Mts., 1890 m (6200'), (Timberlake) 1♂ 13-IX-1962 *Chrysothamnus nauseosus*, 1♂ 14-IX-1962; Valley of the Falls, *Eriogonum subscaposum*, 1♂ 29-VIII-1935, 1♀ 7-IX-1935; 1♂ 27-VIII-1935; 3.2 km (2 mi.) SW Seven Oaks, 1♂ 3-X-1967 (P. A. Rude) CIS; Upper Santa Ana River, (A. L. Melander), 1♂ 14-IX-1949, 1♂, 1♀ 15-IX-1949, 1♀ 21-IX-1949, 1♂ 23-IX-1947, 1♂, 1♀ 7-IX-1948, (Grace H. and John L. Sperry), 1♀ 19-IX-1946 *Chrysothamnus parryi*, 1♂ 22-IX-1946 *Chrysothamnus parryi*, 1♂ 24-VIII-1946, 3♂♂ 6-IX-1946 *Gutierrezia sarothrae*, 1♂ 6-IX-1946 *Chrysothamnus nauseosus*, 1♂ 6-IX-1946 *Senecio ionophallus*, (Paul H. Arnaud, Jr.), 5♂♂ 9-IX-1958 CAS;

Additional Material Examined: U.S.A.: California: Antioch, 1♂ 18-VIII-1974 (B. Villegas) UCD; San Pedro, 1♂, 25-X-1909 (G. R. Pilate) CAS; Contra Costa Co., Antioch sand dunes, 1♂ 7-X-1967 (T. W. Davies) CAS; Inyo Co., CSDA; 19.3 km (12 mi) SW Little Lake, 1♂, 1♀ 16-IX-1969 *Chrysothamnus* sp. (M. Wasbauer) CSDA; Kern Co., 3.2 km (2 mi.) W Frazier Park, 1♂ 6-X-1967 *Chrysothamnus* (P. A. Opler), CIS; Santa Clara Co., 1♂ CIS;

Nomada (Nomadita) verecunda Cresson

Nomada verecunda Cresson, 1879. American Hymenoptera 203. Lectotype, male: "Nev., 2565". Type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis: Differs from *aquilarum*, *mutans*, and *snowii* by having yellow rather than white maculations. Differs from *placida* by the lack of medially interrupted transverse maculations on the abdominal terga. Differs from *timberlakei* by the flattened, sparsely punctate, highly polished scutellum, sharply angulate apex of the pronotal ridge sublaterally, and the highly reflective integumental maculations of the abdominal terga.

Male: Length 6.3–8.9 mm, forewing length 4.7–5.9 mm, hindwing length 3.6–4.5 mm; scape densely punctate anteriorly, sparser interiorly; IOD 0.42 mm, OOD 0.41 mm, MLOD 0.14 mm, MOD 0.18 mm, MOOM 0.49 mm; pre-occipital ridge sharply angulate; labrum with median subapical nipple; acetabular carina strong; pre-lobar carina somewhat flattened; pronotal ridge not sharply angulate anteriorly, depressed medially; tegulae punctate, sparsely along margins, glassy; scutellum flattened, slightly depressed medially; metapleuron evenly punctate; pro-coxal spine rudiments lacking; hind tibial apex with 6 bristles in an offset double row; forewing with 3 submarginal cells: COLOR: clypeus, anterior of scape, sides of face extending to vertex, labrum, mandibles (except tips), pronotal ridge and lobes; tegulae, scutellum, anterior margin of mesopleuron and longitudinal mesopleural band, coxae, apical portions of femora, tibiae, tarsi, meso- and meta-sternal apices, transverse median bands on terga and sterna, orangeish-yellow; remainder of body dark brown to black.

Female: length 6.2–8.5 mm, forewing length 4.4–5.6 mm, hindwing length 3.6–4.4 mm; very similar to males, but with more extensive yellow markings.

Discussion: See *timberlakei*.

Material Examined: U.S.A.: California: Boca Dam 17.7 km (11 mi) E Truckee, 1 ♂ 24–VIII–1956 *Chrysothamnus nauseosus* ssp. *speciosus* (E. G. Linsley) CIS; Lake Tahoe, 1 ♂ (Thompson) CIS; Mt. Lassen N P, 1 ♂ 10–VIII–1940 (Richard L. Post) ORSU; Mt. Lassen Nat. Park, 2290 m (7500'), 1 ♂ 30–VII–1947 (R. M. Bohart) USNM, 2320 m (7600'), 1 ♂ 30–VII–1947 (R. M. Bohart) UCD; Nr. Lk. Eleanor Yos. Park, 1 ♀ 29–VII–1930 (E. C. Zimmerman) CAS; Sagehen nr. Hobart Mills, 1 ♂ 10–VIII–1951 *Eupatorium occidentale* (E. G. Linsley) CIS; Sonora Pass, 1 ♀ 30–VII–1954 (J. C. Downey) UCD; Tahoe, 1 ♀ –VII–1925 (F.X.W.) LACM; Alpine Co., Winnemucca Lk., 1 ♂ 30–VIII–1959 (P. M. Marsh) UCD; Eldorado Co., Echo Summit, 1 ♀ 4–VIII–19 (T. R. Haig) BBSL; Fresno Co., Huntington Lake 2130 m (7000'), 1 ♂ 30–VII–19 (E. P. VanDuzee) CAS; Mono Co., 32.2 km (20 mi) E Jct. Hwy. 120–395, 1 ♀ 9–IX–1958 (A. D. Telford) UCD; Nevada Co., Sagehen Crk, 1 ♀ 23–VII–1968 (C. J. Horning) UCD; Placer Co., Brockway, 1 ♂ –VII–1941 (G. E. Bohart) BBSL; Plumas Co., 12.9 km (8 mi) NW Chester, 1 ♂ 18–VIII–1958 (J. Powell) CIS; Shasta Co., Lassen Natl. Pk., 1 ♀ 16–VIII–1961 (R. F. Wilkey) CSDA; Old Station, 8.1 km (5 mi.) SW, 1 ♂ 25–VIII–1958 *Haplopappus bloomeri* ssp. *angustatus* (J. Powell) CIS; Sierra Co., Gold Lake, 1950 m (6400'), 1 ♂ 30–VIII–1977 (H. K. Court) CAS; nr. Gold Lake, 1 ♀ 13–VIII–1963 (R. L. Westcott) LACM; Weber Lake, 1 ♀ 4–VIII–1951 (E. I. Schlinger) BBSL; Yuba Pass, 1 ♂ 30–VII–1958 (A. A. Grigarick) UCD; Siskiyou Co., Castle Lake, 1 ♀ 29–VIII–1958 (J. Powell) CIS; Isinglass Lk T43N R11W Sec 1, 1980 m (6500'), 1 ♂ 12–VIII–1979 (T. Griswold) BBSL; Medicine Lake, 1 ♂ 5–IX–1955 (Joe Schuh) BBSL; Trinity Co., Lower Cyn

Cr Lk T36N R10W Sec21, 1♂ 29-VII-1979 (T. Griswold) BBSL; Tulare Co., Mineral King, 1♂ 7-VII-1942 (R. Bohart) BBSL; Tuolumne Co., Sonora Pass, 1♂ 4-VIII-1948 (P. D. Hurd & J. W. MacSwain) CIS; Nevada: 1♂ ANSP paratype 2565.6; 1♂ ANSP paratype 2565.7; 1♂ ANSP paratype 2565.10; 1♀ ANSP paratype 2565.5; 40♂♂ ANSP; 1♀ USNM; 2♂♂ UCM; 1♂ ANSP paratype 2565.4; 1♂ ANSP paratype 2565.9; 1♂ ANSP paratype 2565.3; 1♂, 1♀ Fallon, 10-VI-1960 BBSL; Oregon: 8.1 km (5 mi) W. Suttle Lake, 1♀ 30-VII-1939 (Gray & Schuh) ORSU; Crater Lake Park, Pole Bridge Meadow, 1800 m (5900'), 1♂ 11-VIII-1935 (H. A. Scullen) UCM, 1♂, 4♀♀ 11-VIII-1935 (Geo. Ferguson) ORSU, 12.9 km (8 mi.) out Medford Rd., 1680 m (5500'), 2♀♀ 10-VIII-1930 *Solidago* sp. (H. A. Scullen) ORSU, East entrance, 1680 m (5500'), 1♀ 28-VIII-1930 (H. A. Scullen) ORSU, Lost Creek, 1830 m (6000'), 1♂ 14-VIII-1930 *Solidago* sp. (H. A. Scullen) ORSU, 1♂ 14-VIII-1930 *Solidago* sp. (F. Lyle Wynd) ORSU, Sun Creek Meadow, 1980-2130 m (6500-7000'), 1♀ 26-VIII-1930 (H. A. Scullen) ORSU; Mt. Hood, 910-1830 m (3000-6000'), 2♀♀ 4-VIII-1925, 7♀♀ 5-VIII-1925, (C. L. Fox) CAS; Deschutes Nat'l. Forest, Elk Lake, 1♂, 21-VIII-1937, Sparks Lake, 1♀ 21-VIII-1937 (Bolinger Jewett) ORSU; Three Sisters, nr. Lava, 1♀ 15-VIII-1926 (H. A. Scullen) ORSU; Klamath Co., Lake of the Woods, 1♂ 6-VIII-1959 (P. F. Torchio) BBSL;

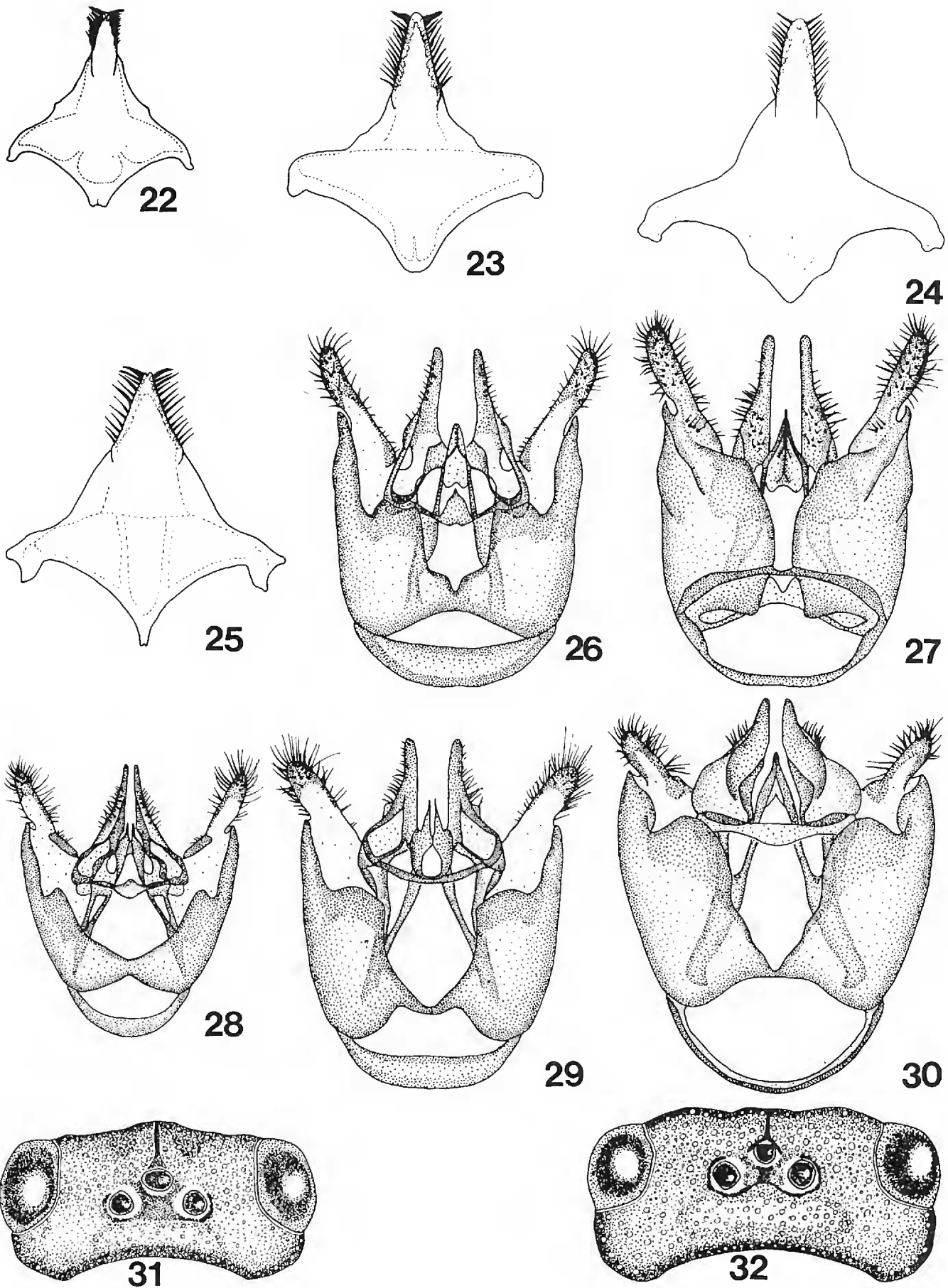
SUBGENUS *ASTERONOMADA*

Nomada subgenus *Asteronomada* NEW SUBGENUS

Type species *Nomada adducta* Cresson, 1878.

Diagnosis: Differs from *Nomada* s.s. by lack of bidentate mandibles, the first flagellar antennal segment distinctly longer than second (up to twice as long), or the rufous color found in both sexes. Differs from *Holonomada* and *Laminomada* by having the hind tibial apex with a single row of stout bristles instead of a dense cluster of pale setae. Differs from *Phelonomada* by rufous coloration and short, stout hind tibial apical bristles. Differs from *Pachynomada* and *Nomadita* by the presence of dense, appressed pubescence on the dorsum of the hind coxa and sides of the propodeum (completely hiding the underlying integument). Differs from *Pachynomada* by the lack of ventral subapical hooks on the penis valves. Differs from *Nomadita* by the elongated, narrow apex of the eighth sternum in males, and the presence of fine setae on the margins of the sternum (*Nomadita* has stout bristles on the margin).

Description: Length 6.7-11.6 mm, forewing length 4.9-8.4 mm; first flagellar segment significantly longer than second; occipital margin rounded to slightly angulate; supraclypeal area distinctly protruding between antennal insertions with distinct frontal carina; labrum with a subapical transverse ridge, in some species broken into irregular denticles; acetabular carina present; mandibles simple; head densely punctate with smooth, shiny IPS: Pronotal ridge apex sharply angulate anteriorly, very narrow medially; pre-lobar carina reduced or absent; scutum distinctly higher than pronotum, curved abruptly downward to it, densely punctured, puncture rims rounded, IPS smooth, shiny; tegulae sparsely punctate, glassy; axillae rounded dorsally; sides of propodeum and hind coxae densely covered with short, appressed, silvery white, plumose hairs; mesopleuron with dense, but not contiguous punctation, hypoepimeral area not prominent; hind tibial apex with a single row of stout bristles; forewing with three submarginal cells; abdominal terga with a distinct apical depressed area which is often impunctate, this area can occupy up to one-third width of terga; male sternum 8 with long thin apex (broad basally in *adducta*) and fine lateral



Figs. 22–22, subgenus *Asteronomada*

Figs. 22–25, male sternum 8; 22) *portalensis*, 23) *durangoae*, 24) *brewsterae*, 25) *adducta*; Figs. 26–30, genital capsule; 26) *adducta* (dorsal), 27) *adducta* (ventral), 28) *portalensis* (dorsal), 29) *durangoae* (dorsal), 30) *brewsterae* (dorsal); Fig. 31) *brewsterae* (dorsal view of vertex); 32) *durangoae* (dorsal view of vertex)

setae; genital capsule (dorsally) with gonocoxites apically separated by a broad emargination; penis valves lacking ventral subapical projection.

Discussion: This subgenus occupies a position intermediate between *Pachynomada* and *Nomadita*. *Nomada adducta* has much in common with *Pachynomada*, including the swollen male antennal scape (a feature it shares with *brewsterae*, but not with *durangoae* and *portalensis*). *Asteronomada* differs from *Pachynomada* by the lack of ventral subapical hooks on the penis valves, the hind basitarsus is flattened, not inflated medially, and is not widest at the midpoint, and *Asteronomada* species have a patch of dense appressed hair (completely hiding the integument beneath) on the sides of the propodeum. *Asteronomada* differs from *Nomadita* by the lack of a subcarinate angulation of the occipital margin, by the shape of the eighth sternum, and the appressed hairs of the propodeum which completely cover the integument beneath them. The rufo-ferruginous body color of *Asteronomada* species differs from all *Nomadita* species.

KEY TO THE SPECIES OF *ASTERONOMADA*

- 1) Vertex raised, forming a prominent transverse post-ocellar ridge 2
 Vertex not forming a prominent transverse post-ocellar ridge 3
- 2) Males without globose antennal scape, post-ocellar ridge bordered anteriorly by a shiny, impunctate groove, joining a longitudinal groove between ocelli to form a "T" *durangoae* n.sp.
 Males with antennal scape globose, post-ocellar ridge not bordered anteriorly by a shiny, impunctate groove joined to a longitudinal groove between ocelli
 *brewsterae* n.sp.
- 3) Males with globose antennal scape, apical impunctate band of tergum 3 narrow, (about 3 puncture diameters in width) *adducta* Cresson
 Males without globose antennal scape, apical impunctate band of tergum 3 wide (one-third total width of tergum) *portalensis* n.sp.

The Species of *Asteronomada*

Nomada (Asteronomada) adducta Cresson NEW COMBINATION *Nomada adducta* Cresson, 1878. American Hymenoptera 73. Holotype, male: "Col., 2591". Type Depository, Academy of Natural Sciences of Philadelphia.

Diagnosis: Differs from *portalensis* and *durangoae* by the presence of a densely punctate, globose antennal scape in males. Differs from *portalensis* by the narrow apical impunctate band of tergum 3. Differs from *durangoae* and *brewsterae* by the lack of a prominent raised, transverse ridge behind the ocellar triangle.

Male: Length 8.9–10.3 mm, forewing length 6.4–6.9 mm, hindwing length 5.0–5.2 mm; antennal scape globose, heavily punctate, smooth, shiny IPS, posterior densely micro-punctate; IOD 0.44 mm, OOD 0.46 mm, MLOD 0.17 mm, MOD 0.20 mm, MOOM 0.54 mm; occipital margin smoothly rounded; labrum with broken transverse subapical carina, and median nipple; acetabular carina strongly lamellate; prelobar carina sharp, short; pronotal ridge strongly angulate apically; scutum deeply reticulately punctured; scutellum distinctly bilobate, postero-medial region with roughened, dull IPS; metanotum flattened; hind coxae and sides of propodeum covered with short, densely appressed, plumose hairs; ventral metapleuron punctate; pro-coxal spine rudiment lacking; hind tibial apex with 4 stout, ferruginous bristles; basitarsus not medially inflated, angulate anterior margin; forewing with 3 submargi-



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Figure 34. Distribution of the species of the subgenus *Asteronomada*

nal cells, apices slightly infuscated: COLOR: rufous; clypeus, sides of face, labrum, basal half of mandibles, creamy-yellow; pronotal ridge and lobes, tegulae, metanotum, scutellum, legs, ferruginous; propodeum dark ferruginous; vertex and apical tergal segments fuscous.

Female: Length 8.7–10.4 mm, forewing length 6.1–7.3 mm, hindwing length 4.6–6.1; facial markings more ferruginous than yellow. Antennal scape not globose.

Discussion: This species is widely distributed, but uncommon. This may be due in part to its late season of flight when most collectors are not active. From brief field observations, its behavior patterns seem similar to *Pachynomada* (pers. obs.), and it is often collected in the same areas.

Material Examined: U.S.A.: Arizona: Cochise Co., Apache 0.8 km (0.5) mi N, 1♂ 4-IX-1972 *Helianthus* (R. R. Snelling) LACM; Kansas: Marysville, 1♂ 12-IX-1920 *Solidago* (Edna M. Stevens) UCM; Douglas Co., 2♂♂ 25-VIII-1949 *Helianthus annuus* (Michener-Beamer) SMEK; Phillips Co., 590 m (1940'), 2♀♀ 30-VIII-1912 (F. X. Williams) UNEB; Nebraska: 20.9 km (13 mi) N. of Harrison, 2♂♂ 28-VIII-1959 BBSL; Bennet, 1♀ 21-VIII-1936 LACM; Lincoln, 1♀ -IX- UCM, 2♀♀ 17-VIII-1902 *Solidago* (M. H. Swenk) UNEB, 1♂ 27-VIII-1902 *Solidago* (M. H. Swenk) UNEB, 3♂♂ 28-VIII-1900 (J. C. Crawford) UCM, 1♀ 30-VIII-1900 *Helianthus* sp. (Crawford) UCM, 4♀♀ 30-VIII-1900 (J. C. Crawford), 1♂, 1♀ 30-VIII-1900 (J. C. Crawford) USNM, 1♂ 30-VIII-1961 *Helianthus* (W. E. LaBerge) BBSL, 1♂ 30-VIII-1961 *Helianthus* (W. E. LaBerge); Mitchell, 1♀ 12-VIII-1916 (C. E. Mickel) UNEB; Omaha, 1♀ 25-VIII-1914 (L. T. Williams) UNEB; Sioux Co., 12.9 km (8 mi.) N Harrison, 1♂ 9-VIII-1971 (J. G., B. L., K. C. Rozen) BBSL; Utah: Garland 1♂ 1-IX-1932 (G. F. Knowlton, M. J. Janes) BBSL; Salt Lake, 1♂ 6-VIII-1974 *Helianthus* Timberlake LACM; Salt Lake City, 1♂ 1923 (H. R. Hagan) BYU; Cache Co., Hyrum Dam, 28-VIII-1987, 1♂ (N. N. Youssef) 1♀ (D. K. Broemeling), *Grindelia*; Logan, 1♂ 27-VIII-1947 BBSL; Garfield Co., 9.7 km (6 mi.) SE Escalante, 1♂ 30-VIII-1985 *Helianthus* sp. (D. K. Broemeling) BBSL; Utah Co., 1♂ -IX-1932 (Vasco M. Tanner) BYU;

Nomada (Asteronomada) brewsterae NEW SPECIES

Holotype, male: "Brewster Co., 10-8-35, TX, 6228". Type Depository, University of Colorado, Boulder.

Diagnosis: Differs from *adducta* and *portalensis* by the presence of a prominent transverse ridge behind the ocellar triangle. Differs from *adducta* by having wide apical impunctate bands on the abdominal terga (much greater than 3 puncture diameters). Differs from *durangoae* by the globose antennal scape of the males, and by the lack of a shiny impunctate groove posterior to the ocellar triangle, joined to a longitudinal groove between the ocelli.

Males: Length 11.1 mm, forewing length 8.4 mm, hindwing length 5.9 mm; antennal scape globose, very sparsely, shallowly punctate, highly polished, lacking posterior apical shelf of *Pachynomada*; IOD 0.45 mm, OOD 0.51 mm, MLOD 0.16 mm, MOD 0.24 mm, MOOM 0.55 mm; occipital margin not angulate; vertex behind ocellar triangle forming distinct ridge; area within ocellar triangle flattened, not grooved; vertex lacking micro-punctures (see *durangoae*); frontal carina flattened apically, like a *Pachynomada*; clypeus gently rounded; labrum with strong transverse subapical carina, forming medial beak; acetabular carina strongly lamellate; pre-lobar carina short, reduced; pronotal ridge sharply angulate-carinate anteriorly; scutum densely reticulately punctured, puncture rims angulate; axillae flattened dorsally, but with rounded exterior margin; scutellum bilobate, punctate, shiny; metanotum expanded medially; hind coxae and sides of propodeum covered with short, appressed, highly plumose hairs; pro-coxal spine rudiment present, not strong; hind-tibial apex with at least 5 clear bristles; basitarsus with gently curved posterior margin; tergal impunctate bands wide; forewing with 3 submarginal cells: COLOR:

rufous; lower face, clypeus, mandibles, malar space, pronotal lobes, outer area of tegulae, scutellar lobes, metanotum, yellow (discolored by cyanide in type): supra-clypeal area, post-antennal area up to vertex, expanded laterally along occipital margins, pronotum (except apex of ridge), anterior margin of mesopleuron, median longitudinal scutal band, scutal margins, propodeum and metapleuron, coxal bases, bases of terga, and bases of sterna, posterior basal mid-femora, posterior hind-femora, black.

Females: Unknown.

Discussion: Like *N. adducta*, this species resembles a *Pachynomada*. However, the penis valves lack a ventral subapical hook, and the hind basitarsus is not widest medially as in *Pachynomada*.

Material Examined: This species is known only from the type.

Nomada (Asteronomada) durangoae NEW SPECIES

Holotype, male: "MEX. Durango, Bermejillo, X-5-66, GE & AS Bohart, near *Helenium*". Type Depository, United States National Museum.

Diagnosis: Differs from all other *Asteronomada* species by having a prominent transverse ridge behind the ocellar triangle which is bordered anteriorly by a polished, impunctate groove, connected to a median longitudinal groove to form a "T". Differs from *adducta* and *brewsterae* males by the lack of a swollen, globose antennal scape. Differs from *adducta* by having wide apical impunctate bands on the abdominal terga (much wider than 3 puncture diameters). The presence of tiny punctures interspersed with normal sized punctures on the vertex are unique within the subgenus.

Males: Length 11.6 mm, forewing length 8.0 mm, hindwing length 6.1 mm; antennal scape densely punctate with smooth shiny IPS, not globose; IOD 0.44 mm, OOD 0.55 mm, MLOD 0.19 mm, MGD 0.24 mm, MOOM 0.65 mm; occipital margin slightly angulate; distinct impunctate transverse groove behind lateral ocelli, joined by a median groove leading to mid-ocellus; sub-antennal area at same level as clypeus, not curving downwards; deep, large (0.04 mm) punctures on vertex interspersed with shallow micro-punctures (0.01 mm); subapical transverse carina of labrum not interrupted; mandibular bases clearly punctate; acetabular carina with thickened lamella; pre-lobar carina flattened, indistinct; pronotal ridge angulate anteriorly, very thin medially; scutum distinctly higher than pronotal ridge or lobes, with dense round punctures, rounded rims, smooth shiny IPS; tegulae densely punctate basally, postero-lateral area virtually impunctate, glassy; axillae with gently rounded dorsal surface; scutellum depressed medially, punctate, polished; hind coxae and sides of propodeum covered with short, appressed, highly plumose pubescence; scrobal and pre-episternal sutures shallow, indistinct; ventral metapleuron shiny, micro-punctate; pro-coxal spine rudiments lacking; hind tibial apex with 3 dark, thick bristles; terga deeply, sharply punctate, IPS dull, shagreened; apical impunctate bands quite wide (0.11–0.20 mm); forewing with 3 sub-marginal cells, darkened apex: COLOR: rufo-ferruginous; supra-clypeal area above termination of frontal carina, frons behind antennal insertion through vertex, median longitudinal band on scutum, entire propodeal disk, base of mid-coxae and propodeum anterior to spiracles, black; apex of clypeus, malar space, mandibular bases, somewhat yellowish.

Females: Unknown.

Discussion: This species is as large as *N. adducta* or *N. brewsterae*, but lacks the

globose antennal scape in males. It resembles *N. portalensis* but is significantly larger, in addition to the other differentiating characters given.

Material Examined: This species is known only from the type.

Nomada (Asteronomada) portalensis NEW SPECIES

Holotype, male: "Kirkland Jct., Yavapai Co., Ariz., IX-15-61, *Gutierrezia microcephala*, P. D. Hurd Collector". Type Depository, University of California, Berkeley. Allotype, female: "Arizona, 4 mi E. Portal, 19-IX-1962 J. Willcox". Type Depository, Natural History Museum of Los Angeles County.

Diagnosis: Differs from males of *adducta* and *brewsterae* by the lack of a globose antennal scape. Differs from *brewsterae* and *durangoae* by the absence of a prominent transverse ridge posterior to the ocellar triangle. Differs from *adducta* by the wide apical impunctate bands on the abdominal terga (much greater than 3 puncture diameters).

Males: Length 6.7–9.6 mm, forewing length 4.9–5.9 mm, hindwing length 3.6–4.3 mm; antennal scape sparsely punctate, IPS shiny, smooth, not globose; IOD 0.33 mm, OOD 0.35 mm, MLOD 0.13 mm, MOD 0.18 mm, MOOM 0.48 mm; occipital margin smoothly rounded; vertex flattened within ocellar triangle, sparsely punctate, smooth but not shiny; supraclypeal area not as protruberant as *Pachynomada* or *Nomadita*, frontal carina knife-edged; subantennal area protruding and flattened, curving down slightly to clypeus; clypeus flattened; subapical transverse carina of labrum broken into flattened denticles; acetabular carina strongly lamellate; mandibular basal area virtually impunctate; pre-lobar carina fairly strong, gradually sloping; pronotal ridge with sharply angulate apex, extremely thin (dorsoventrally) medially; scutum distinctly humped above pronotal ridge and lobes; scutal punctation nearly contiguous, punctures round, IPS glassy, rims of punctures rounded; axillae smoothly rounded apically; scutellum faintly bilobate, highly polished surface; metanotum polished, punctate, protruding somewhat medially; supraspiracular ridge lacking; sides of propodeum and hind coxae densely covered with short (0.07 mm) appressed, highly plumose hairs; mesopleuron contiguously punctured, round, IPS glassy, rims of punctures rounded, hypoepimeral area not distinctly protruberant; pro-coxal spine rudiment lacking; hind tibial apex with 4 pale bristles; terga densely punctate with dull shagreened interpunctural surface, apical impunctate band on terga 3–5 very wide (0.19 mm); forewing with 3 submarginal cells: COLOR: light rufo-ferruginous; malar space, apex of clypeus, basal half of mandibles, labrum, yellowish; ocellar triangle, middle of propodeal disk, base of mid-coxae, black.

Female: same as in male.

Discussion: This is the smallest *Asteronomada* species, being about the size of a small *Nomadita*. The extent of fuscous to black markings is quite variable in this species.

Paratypes: U.S.A.: New Mexico: 14 km W. Animas, 1 ♂ 20–25/VIII–1979 (J. v.d. Vecht); Grants, 1 ♂ 20–VIII–1963 *Tamarix gallica*; Hidalgo Co., 11.3 km (7 mi) SE Portal AZ, 1 ♂ 12–IX–1985 (D. K. Broemeling); Texas: 32.2 km (20 mi) E Kent, 1 ♂ 28–IX–1957 (W. Nutting & F. Werner);

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